

Claims

1. A method for examining a brain function of a subject, comprising the acts of:
introducing optical radiation in the visible to infra-red range from a light source
into the brain of a subject and detecting radiation that has migrated in a brain region to a
5 detector;
providing brain stimulation while introducing and detecting said optical radiation;
storing said detected radiation and creating optical data; and
evaluating said optical data to determine a brain function of the subject.
- 10 2. The method of claim 1, wherein said acts of introducing and detecting optical
radiation are performed to obtain “rest ” optical data at a low level of said brain
stimulation, and said acts of introducing and detecting optical radiation are performed to
obtain “functional ” optical data at a high level of said brain stimulation.
- 15 3. The method of claim 1 or 2 further including introducing and detecting optical
radiation to obtain “background ” optical data without said brain stimulation.
4. The method of claim 1, wherein said providing a brain stimulation includes
providing visual stimulation.
20
5. The method of claim 1, wherein said providing a brain stimulation includes
stimulating cognitive function of the brain.
6. The method of claim 1, wherein said providing a brain stimulation includes
25 stimulating memories stored in the brain.
7. The method of claim 4, wherein said providing visual stimulation includes
displaying a picture.
- 30 8. The method of claim 4, wherein said providing visual stimulation includes
displaying a movie.

9. The method of claim 1, wherein said providing a brain stimulation includes providing auditory stimulation.

5 10. The method of claim 1, wherein said acts of introducing and detecting optical radiation are performed while performing a mental activity.

11. The method of claim 1, wherein said acts of introducing and detecting optical radiation are performed while performing a physical activity.

10

12. The method of claim 1, wherein said acts of introducing and detecting optical radiation are performed over an extended period of time.

13. The method of claim 1, wherein said evaluated brain function includes an
15 emotional response.

14. The method of claim 13, wherein said emotional response is a signature of propensity to violent behavior.

20 15. The method of claim 13, wherein said emotional response is a signature of propensity to antisocial behavior.

16. The method of claim 1, wherein said evaluated brain function includes a cognitive response.

25

17. The method of claim 1, wherein said evaluated brain function includes initiating a verbal response.

18. The method of claim 1, wherein said evaluated brain function includes
30 initialing a signals to a specific muscle.

19. The method of claim 1, wherein said optical data includes blood volume or blood oxygenation.

20. A method for detecting deceit by a subject, comprising the acts of:
5 introducing optical radiation in the visible to infra-red range from a light source into the brain of a subject and detecting radiation that has migrated in a brain region to a detector;
providing brain stimulation and receiving a response from said subject while introducing and detecting said optical radiation;
10 storing said detected radiation and creating optical data; and
evaluating said optical data to determine whether said response was a knowingly false response.

21. The method of claim 20, wherein said providing a brain stimulation includes
15 providing auditory stimulation or a visual stimulation.

22. The method of claim 20, wherein said acts of introducing and detecting optical radiation are performed to obtain “rest ” optical data at a low level of said brain stimulation, and said acts of introducing and detecting optical radiation are performed to
20 obtain “functional ” optical data at a high level of said brain stimulation.

23. The method of claim 22 further including introducing and detecting optical radiation to obtain “background ” optical data without said brain stimulation.

25 24. The method of claim 20 further including measuring skin conductance of the subject and providing conductance data for evaluation with said optical data to determine whether said response was a knowingly false response.

25. The method of claim 20 further including measuring skin conductance of the
30 subject and providing conductance data for evaluation with said optical data to determine whether said response was a knowingly false response.

26. The method of claim 20 further including measuring respiration of the subject and providing respiration data for evaluation with said optical data to determine whether said response was a knowingly false response.

5

27. The method of claim 20 further including measuring temperature of the subject and providing temperature data for evaluation with said optical data to determine whether said response was a knowingly false response.

10 28. The method of claim 20 further including measuring electrical signals detected by at least one electrode attached to the subject and providing electrical data for evaluation with said optical data to determine whether said response was a knowingly false response.

15 29. A system for examining a brain function of a subject, comprising:
 a light source constructed and arranged to introduce optical radiation in the visible to infra-red range transcranially into the brain of a subject;
 a light detector constructed and arranged to detect radiation that has migrated in a brain region of the brain of the subject;
20 a stimulation module constructed and arranged to provide brain stimulation while said optical radiation is being introduced and detected;
 electronics constructed and arranged to store said detected radiation and to create optical data; and
 a processor constructed and arranged to evaluate said optical data to determine a
25 brain function of the subject.

 30. A system for detecting deceit by a subject, comprising:
 a light source constructed and arranged to introduce optical radiation in the visible to infra-red range transcranially into the brain of a subject;
30 a light detector constructed and arranged to detect radiation that has migrated in a brain region of the brain of the subject;

a stimulation module constructed and arranged to provide brain stimulation and to receive a response from said subject while said optical radiation is being introduced and detected;

electronics constructed and arranged to stores said detected radiation and to create
5 optical data; and

a processor constructed and arranged to evaluating said optical data to determine whether said response was a knowingly false response.

10 31. The system of claim 30 further including an EEG module.

32. The system of claim 30 further including an MEG module.

33. The system of claim 30 further including a thermography module.

15 34. The system of claim 30 further including a respiratory module.

35. The system of claim 30 further including a skin conductivity module.

20